



NTSB National Transportation Safety Board

Office of Railroad, Pipeline, and Hazardous Materials Investigations
Office of Research and Engineering

Overview of SCADA Related Pipeline Accidents

Previous Accidents

- Brenham, TX, April 7, 1992
- Gramercy, LA, May 23, 1996
- Fork Shoals, SC, June 26, 1996
- Murfreesboro, TN, November 5, 1996
- Knoxville, TN, February 9, 1999
- Bellingham, WA, June 10, 1999
- Winchester, KY, January 27, 2000
- Greenville, TX, March 9, 2000
- Chalk Point, MD, April 7, 2000

Brenham, Texas



Brenham, Texas



Gramercy, Louisiana



Gramercy, Louisiana

GRIV_ZACH_10

05/23/96 22:02:41 Plantation

Upstream Gravity

Value=61.6646 API - analog dev

GRIV_ZACH_10

05/23/96 22:02:34 Plantation

Mainline Pressure

Value=328.829 PSI - analog dev

GRIV_ZACH_10

05/23/96 22:02:30

Garyville - Zachary 10" products

Line Balance - ALARM - 5min (-731.71, 15min (-890.7), 60min (-923.7)

GRIV_ZACH_10

05/23/96 22:02:19 Garyville

Suction Pressure

Value=14.8148 PSI - analog dev

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Gramercy, Louisiana

GRIV_ZACH_10

05/23/96 22:02:41 Plantation

Upstream Gravity

Value=61.6646 API - analog dev

GRIV_ZACH_10

05/23/96 22:02:34 Plantation

Mainline Pressure

Value=328.829 PSI - analog dev

GRIV_ZACH_10

05/23/96 22:02:30

Garyville - Zachary 10" products

tine Balance - ALARM - 5min (-7.1.71, 15min (-8.90.7), 60min (-9.23.7)

GRIV_ZACH_10

05/23/96 22:02:19 Garyville

Suction Pressure

Value=14.8148 PSI - analog dev

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Gramercy, Louisiana

GRIV_ZACH_20

05/23/96 23:01:56

Booster 31

Issued command STOP by ripley at FPLXOS6

GRIV_ZACH_20

05/23/96 23:01:52

Booster 30

Issued command STOP by ripley at FPLXOS6

GRIV_ZACH_20

05/23/96 23:00:30

Garyville - Zachary 20" products

Line Balance - ALARM - 5min (-763.4), 15min (-2256.5), 60min (-7388.8)
2hr (-7443.5), 4hr (-7482.6), 24hr (-7546.6)

GRIV_ZACH_20

05/23/96 22:51:10 Garyville

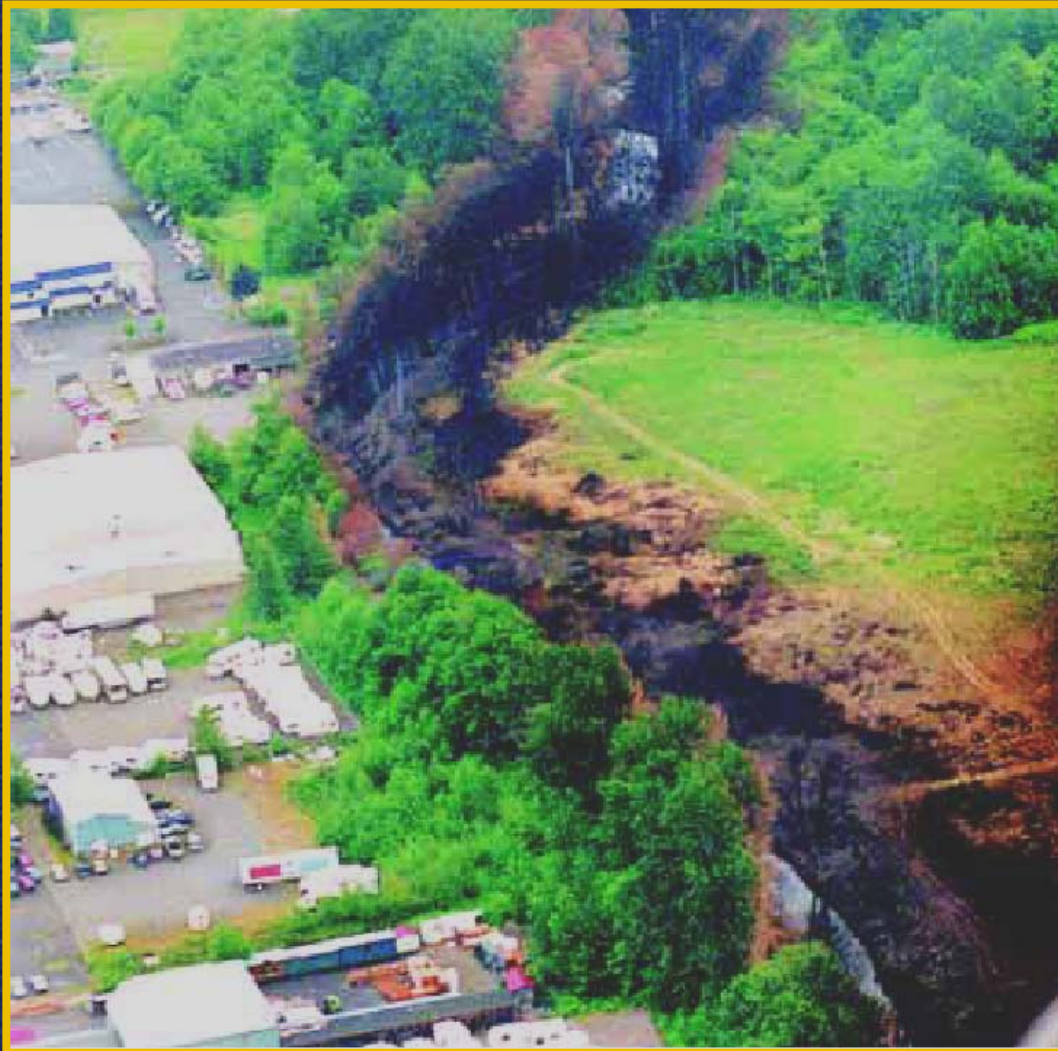
Booster 22

Uncommanded change to state RUN

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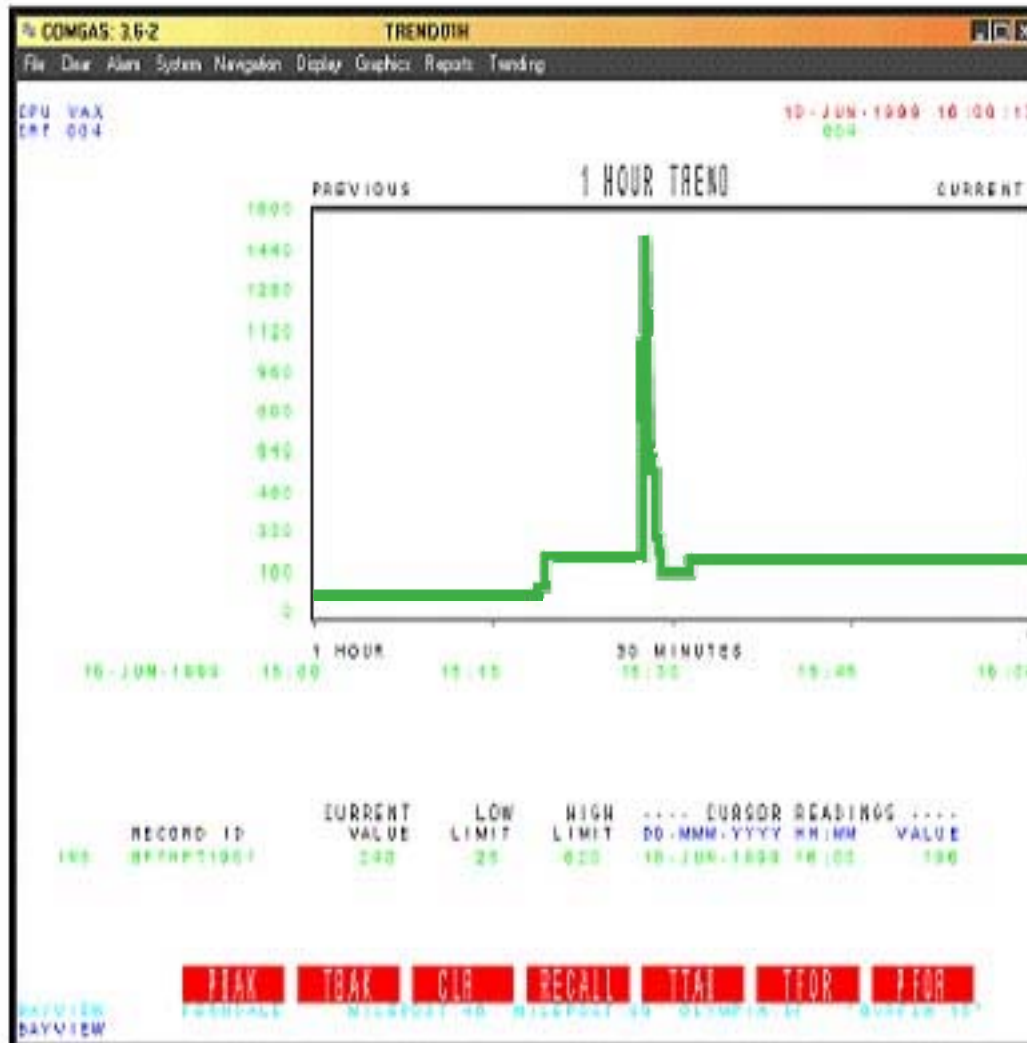
Bellingham, Washington



Bellingham, Washington

- Historical records added to the on-line SCADA computer
- Computer system became unresponsive
- Meanwhile a pressure buildup occurred in the pipeline system which led to the rupture

Bellingham, Washington



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Bellingham, Washington

- Once the SCADA system computer became operational, the controller restarted the pipeline
- After the controller received an alert from computerized leak detection software and a field report of a gasoline smell, he shut down the pipeline

Kingman, Kansas



Kingman, Kansas

APPENDIX 2

04/Dec/03 12:51:20 01-05-04 INLINES AGRIUM KOCH NITROGEN TERRA PRT 1 PRT 2 PRT 3 PRT 4 PREVIOUS NEXT

SYSTEM KEYS

NORTH NH3 MAP	SUCT.	DISC.	DNSTR	UNI	UN2	BP1	BP2	TNK	LEVEL	SETPT	FLOW	V5	V6	V7	BV	VA	DMETER	DL FLOW
BORGER AGM 0.0	0	1002		SE	ON	SE	SE	0	%	550	442						0	0
CANADIAN BLK. 7.5	1080		1079												OP			
FARNSWORTH 280	N 750			LOAD	ULOAD				ME	200		CL			CL	OP	0	INJECT
MOCANE 334	736		DNSTM	OF	OF	OF		70	%	200	0	CL	CL	VA		NBV	0	0
ASHLAND 380			PSI												OP			MC INV
WELLSFORD 422	N 571	1005	1015	ON		BPS					0				OP	OP		
VERDIGRIS TER 122	353	573	569	ON	OF	OR				200	197			OP		OP		
ENID KOCH NIT 118	244	1338	319	ON	OF	OF	OF	57	%	550	452			OP	OP	OP		
HARPER 51	909																	
PARTRIDGE 486.5	596	752	598	OF		0						CL		V7	OP	OP	OP	MMP
CONWAY 0.0	N 763	1100	757	ON		KOCH	77	%	ME	300	0	OP	CL	CL		CL		0
ABILENE 52	N 891	1122		ON	21	MMP	79	%		200	3				OP			INVENT
CLAY CENTER 87						2CTV%	0			300	0	CL						0
LINN 98.5	N 808	1128		OF	ON	23									OP	NBV	*****	
LIL BLUE BLK 117															OP			
BIG BLUE BLK 143.5															OP			
BEATRICE 147	N 931	916		OF	OF	0												
HMSTD BEATRICE	132	117				CTV%	51	%		200	0	CL	2"	3"	TR	NBV	0	
GREENWOOD 194	N 754	1136		ON	28	OF	74	%		300	4	CL	OP	CL	OP	OP	501	
G'WOOD REV. BLK														REV	OP	VA	CL	TO STOR
YUTAN BLK. 215															OP			0
PLATTE R. BLK 219		997	1001												OP			
VALLEY 223		975													OP			
BLAIR TERRA 240		197	871	OF						150	149	OP						
HERMAN 246.5	B 856	849													OP	OP	767	
DECATUR SBK 269															OP			
DECATUR NBK 271															OP			
SGT BLF KOCH 277		96	LAT. PSI			731												
TERRA PT NEAL		95	731	OF				68	%	300	3	CL	OP					0
WHITING 280	N L 686	686		OF		0									OP	OP	0	INVENT
BATTLE CRK 30	N 228	662		ON										BP	CL	OP		
EARLY 1 AGM 60		226	229	OF	OF	OF			ME	200	205	OP	CL	CL	OP	OP	1079	
EARLY 2 AGRIUM		226	1045		ON					550	0							
POCAHONTAS 92		856	853	OF											OP			
LUVIERNE 122		852	650	OF											OP			
GARNER AGRIUM								56	%	400	0							2310

SYSTEM KEYS

TIMELINES REAL TIME TRENDS

TREND SETS DATABASE SUM

TAG SUM EVENT SUM

COMM SUM DIALUP SUM

SVSTEM NOTEPAD DEVICE SUM

SUM HISTORY

PRINT MAP EMERG. RESPONSE

PLAY BACK PB CONTROL

MAP ALARMS ARCHIVE REPORT

HEALTH MONITOR RESTART XOS

PRINT SCREEN SHIFT CHANGE

COMMAND REMOVE ALL

MAPRCC CNVRCC

SITE ASSERT

LOGOFF

Vsysinfo#0:

Control View

RTU

CRK1 0

CRK2 0

12:51:20

04/Dec/03

USER valnet

Vpgview2#0: PAGE

CRT 1 CRT 2 CRT 3 CRT 4 CANCEL

Set Start Time Reset Stop Play Fast Forward Pause

Database Display Commands

Start Time 04/10/27 11:07:00 Current Time 04/10/27 11:15:57

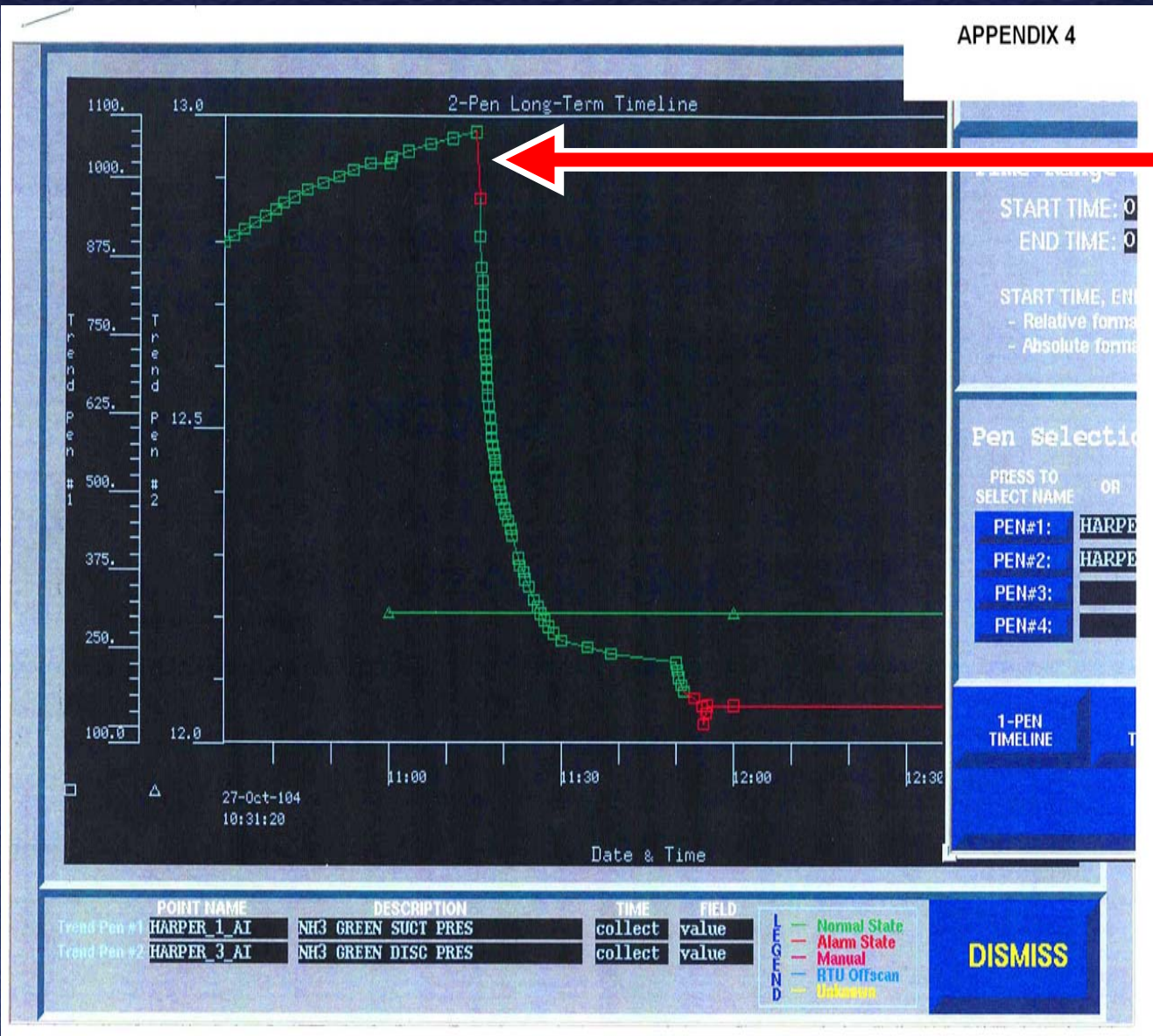
Alarm

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Kingman, Kansas

APPENDIX 4



Drop in Pressure

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